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soil, water, and light; the growth, nutrition, transpiration, and respiration of plants.

III. Weather observations, with special reference to the connection between temperature and plant chronology.

Mathematics.— The aim will be to use number in connection with history and geography in every possible way in which it will help to produce clearer images. Nature-study, cooking, and manual training will demand constant use of denominate numbers and call for skill in using both decimal and common fractions. The field work will demand number in such problems as the numerical relation between the plant life in the small selected area and that of given larger areas; using of data of skiameter and common almanac; measuring inaccessible distances; plotting measure to scale; computing the area of circles, triangles, and rectangles in planning for the school garden.

Manual training.— Making of articles for the general use of the grade, such as plant and insect-boxes; articles in hard wood for home use, for which careful mechanical drawings will be made.

French.—For reading, the story of Racine's *Iphigène*, much simplified, will be used. Certain scenes from Racine's tragedy will be dramatized as indicated in the French outline for April. Written dictation and exercise in the forms of verbs will be given as the need is manifest.

German.—The children have acquired a vocabulary which will enable them to talk and read with a fair degree of fluency upon topics relating to school and home. Reading will be emphasized somewhat, the matter including stories from Grimm's *Fairy Tales*, riddles, and German songs.

Art.— Illustrative drawings of Greek games, costumes, and scenes from some historical events, the best of these to be given to the third grade, which is studying the stories of Greece; in connection with geography, painting of landscape typical of the region studied; paintings as records of observations in nature study.

Music.—The reading and writing of music will be continued by means of such songs as Robert Schuman's "Spring Song," Eleanor Smith's "Pussy Wilow," Cæsar Cui's "Spring is Coming," and Reinecke's "O, Modest Violet."

SEVENTH GRADE.

ELSIE AMY WYGANT.

History.—The following outline by Miss Rice will be the basis of work in history during the spring quarter:

"The general subject of the year's work is the period of discovery and exploration in American history and the settlement of the West. In the first half of the year especial attention was given to mediæval conditions, to the events that led to the discovery of America, and to the development of the art of printing and of inventions connected with navigation.

"Passing rapidly over the colonial history of the Atlantic seaboard, because of the study of these colonies by earlier grades, we followed the pioneers across the Appalachian highlands into the middle West. The remainder of the year is to be devoted to the industrial development of the United States since the Revolutionary War.

"I. The children will trace the relations of the rivers to the mountain system and discover routes by which the settlers advanced into the interior: (1) Connection of Potomac and Ohio; Braddock's Road; Potomac Navigation Company; Washington's shares in company. (2) Cumberland Gap; story of Daniel Boone and the Wilderness Road. (3) The Hudson with its branch, the Mohawk; compare the Susquehanna and the Delaware.

"II. Movement of settlers: (1) Settlement of Kentucky—the "blue grass" region. (2) The Ohio Land Association; settlement of Marietta; Pittsburg as the "Gateway of the West;" flat-boats on the Ohio. (3) Connecticut Land Company; settlement of Cleveland.

"III. Life in the Northwest Territory: rapid growth of population; government land; a typical settlement.

"IV. Necessity of communication between East and West: trade with New Orleans; steamboat on the Ohio; separation of East and West in sympathy; demands for roads; history of the Cumberland Road; the Erie Canal; rage for canals; political union of East and West secured; the first railroads.

"V. Spread of cotton culture and unification of the South.

"VI. Development of the mining industry and settlement of the far West.

"VII. The factory system of labor; comparison of life of individual worker under this system with that of one under the guild system of the Middle Ages.

"REFERENCES: Sparks, *The Expansion of the American People;* Roosevelt, *The Winning of the West;* Turner, 'The Significance of the Frontier in American History,' *Fifth Yearbook of the National Herbart Society;* Wright, *Industrial Evolution of the United States;* Perkins, *Annals of the West;* Hinsdale, *The Old Northwest;* Winsor, *The Mississippi Basin;* Catherwood, *Story of Tonty* and *Heroes of the Middle West;* Irving, *Astoria;* Small and Vincent, 'The Family on the Farm,' *Introduction to the Study of Society.*"

Literature.—The literature studied in the autumn quarter was Tennyson's "Gareth and Lynette," and other selections on the subject of chivalry. During the winter the children are attempting to read Shakespeare's *Merchant of Venice.* For the spring quarter we have selected some short poems illustrating the idea of pleasure in work, as Longfellow's "Nuremberg" and "Keramos."

The children will be encouraged to bring in poems which they know of nature and spring, and some of the following will be read: Bryant, "Robert of Lincoln;" Wordsworth, "Daffodils," "To the Daisy" (second poem);

Lowell, prelude to *Vision of Sir Launfal;* description of spring from *Biglow Papers*, No. VI; Walt Whitman, "Warble for Lilac Time;" Clara Smith, "Jack in the Pulpit;" Lowell, "The Dandelion."

Geography.—The seventh grade will study North and South America as one land mass, working in detail upon the geography of the United States and trying to trace its effect upon the westward movement in the history of the country. We shall follow the work as outlined by Miss Baber in the ELEMENTARY SCHOOL TEACHER for December, 1902, and July, 1901, which for convenience is quoted below:

"North and South America.

"I. Western continent—size; shape; influence of shape upon its cultural development; topography—mountains, plains, plateaus; if American Mediterranean were land, effect upon life-development; if the high ranges of the mountains were on the eastern side of the continent, effect upon life and culture. (1) North America—simple story of the evolution of the continent. (2) South America—location; area; altitude, compare with Africa; physical features: Andes mountains, Guiana highlands, Brazilian highlands, central plain; river basins—Amazon, La Plata, Orinoco, Magdalena, Atrato, Guiana system, Patagonian system; as a system of water highways compare with other continents; climate—temperature, compare with Africa; prevailing winds; rainfall, compare distribution of rainfall with other continents; account for small desert area; native product; distribution of forests, prairies; culture products."

"North America.

"1. Climate: Movement of storms in the United States; distribution of heat; southern limit of winter isotherm of 32°.

"2. Western highlands: Extent, altitude, appearance, and formation of Rocky mountains, Sierra Madre mountains, Sierra Nevada mountains, Coast Range, Mexican Plateau, and Great Basin. Characteristics of river basin found in the western slope of the great highland mass, Colorado, Sacramento, San Joaquin, Columbia, Fraser, Yukon. What attractions for man does this western highland mass possess? What are the influences, both evil and good, of a desert or semi-desert region on the rest of the continent? For agricultural purposes, which is to be preferred, an irrigated region or a region of constant rainfall?

"3. Great central plain: Extent; elevation; winter and summer appearance; glaciated region; account for lakes; non-glaciated region. Characteristics of river basins: Mississippi, Mackenzie, Hudson Bay system. Value of the great plain in the development of the continent.

"4. Eastern highlands: Extent, appearance of (*a*) Canadian highlands; (*b*) Appalachian system; New England mountains; Blue Ridge; Appalachian valley; Alleghany plateau; Piedmont. What is the effect of the Piedmont region on the rivers which cross it?

"5. Coastal plain: Extent; appearance; formation; agricultural value.

"6. Past geographies of North America: How are the past aspects of a continent obtained? What are the evidences that North America has had different coast lines? What are the evidences that the continent has passed through many changes of climate? What proofs are there that the topography has changed?

During the winter quarter the children used sand largely for modeling, though other materials were employed somewhat. During the spring quarter the sand will be used for all quick work, but much more will be done with composite-clay and chalk-modeling. We shall make relief maps of North and South America as one land mass, and North America, South America, and the United States in separate relief maps.

Paintings will be made of typical scenes in the following regions: Brazil, Patagonia, Andes (Chili), Appalachian mountains, Rocky mountains, arid region of the southwestern United States, cotton fields of the South, plains and grain fields of the middle West.

The field work begun in the fall will be continued during the spring in connection with the above work.

Mathematics. — The children began the making of a topographical map during the fall, but were obliged to discontinue the work because of the inclemency of the weather. They chose a neighboring plot of ground, some 300 ×250 feet, upon which they had been making some observations of typical areas. In taking these measurements they learned how to use the compass, plane table, and levels, and how to pace off distances. When the data were brought to the class, the discrepancies were so great that the final map was postponed. It was evident to the children that these inaccuracies were due to lack of skill in handling the instruments, of care in note-taking, and of knowledge of how to transfer angles. The necessary drill on these points took so much time that the second taking of measurements was postponed until spring, but at the first opportunity this work will be completed.

The laying out of the garden will continue this work on surveying, and before the end of the term the children will attempt to make a topographical map of Stony Island — an area familiar through the geographical field work.

Nature study. — The effort in the nature study will be to make this miracle of spring, with more happening every day than one can hope to realize, appeal as most wonderful to the children. Field trips will be taken in early spring, when the first hepaticas are to be found; again when the fruit trees and violets are in bloom; and again when the daisies and buttercups are in blossom and the appearance of summer has really come.

During the year the temperature curve has been kept by means of daily observations, and the average for the month has been plotted on a large chart. By watching for the first signs of spring we shall find the average temperature necessary for growth. From that time temperatures of both soil and air will be kept.

Earthworms, pond life, insects, birds, trees, and wild flowers offer possibilities of interest in continued watching and study. Individual children or groups of children will work upon these topics or similar ones, choosing either the topic or the line of investigation on a given topic when such is practicable. Experience suggests that the initiative is sometimes weak in certain children, because of their ignorance of the possibilities of the subject; therefore suggestions and outlines of work will be given; but, if some clearly defined interest and a power to originate a plan of investigation are shown, such independent work will be encouraged. Each topic will be worked out, the needed apparatus described, and a reading list given. Because of the limits of space in this article one topic only will be worked out and references given for the others.

The children who choose the pond life will need an aquarium and a dredge;[1] those who choose insects, a cigar box filled with earth and covered with glass, or a lamp chimney with bulging sides put into a flower pot and the top fitted with netting, an insect net, and a cyanide bottle; the bird committee, the stuffed birds from the museum and a pair of opera glasses; wild flower committee, tin pans for planting any specimens which they choose to bring home; and all committees a pocket magnifying glass. Weekly reports of the work will be made to the class by means of written notes and painted, drawn, or modeled records.

Suggestions for study: Earthworms: (1) When do earthworms first appear? (2) What have they been doing during the previous winter? (3) To what depths do earthworms burrow? (4) Are the burrows straight, or do they wind about? Why? (5) What is the effect of the burrows on the soil? (6) Do the earthworms work better by day or by night? (7) What do they feed upon? (8) How do they get this food? (9) Can you find any eggs of the earthworm?

Apparatus necessary: a pair of scales, some plaster of Paris, a pocket microscope, and an earthworm cage made as follows: inclose a section of soil 22 inches high, 18 inches wide, and 1 inch thick, in a frame; the frame is made of two pieces of glass, 18 × 22 inches, set into grooves on two pieces of wood, 22 inches by 1½ inches; cover the top with wire netting and place the whole in a pan partly filled with water; keep a black cloth over the case except during times of observation.

Ways of carrying out the suggestions: (3, 4) Probe into a burrow with a long wire and carefully move the soil away from one side as you work. The shape of the burrow may be preserved by pouring in plaster of Paris. A good specimen for a permanent collection may be made by cutting out the section of soil which shows the burrow after the plaster has been poured into it, pouring into the soil a dilute glue to make it hard, and putting the whole into a case made of glass, with the sides pasted together with glued paper. (5) Count casting on a square foot of soil. Remove and weigh. The following morning repeat the experiment. Estimate on an acre of ground. (6) Repeat the above experiment, weighing every night and morning for several days. (7, 8) Place a given weight of leaves or grass at the top of the case and observe what follows. (9) The earthworm eggs are very minute, but they roll them into a ball about the size of a mustard seed, and these may be found about the opening of the burrows, along in June.

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[1] A very simple dredge is made by cutting out the bottom of a tin dipper and soldering a piece of wire netting in its place.

Books which will be helpful: Jackman, *Nature Study*, pp. 303-5; Hodge, *Nature Study and Life*, pp. 424-8; Darwin, *Vegetable Mould and Earthworms;* Bayliss, *In Brook and Bayou.*

REFERENCES: Pond life: Jackman, *Nature Study*, pp. 267, 308, 352; Hodge, *Nature Study and Life*, pp. 277, 297, 411, 431, 432. Making an aquarium and managing it: *Nature Study and Life*, p. 393. Insects: Hodge, *Nature Study and Life*, pp. 45-61, 181-227, 228-72 (this includes references on mounting and preserving insects in three different ways); Comstock, *A Manual for the Study of Insects;* Belle Cragin, *Our Insect Friends and Foes;* Weed, *Life Histories of American Insects;* Jackman, *Nature Study;* McCook, *Tenants of an Old Farm;* Brightwen, *Tenants of My House and Garden;* Beard, *Curious Homes and their Tenants;* Badenoch, *Romance of the Insect World* and *True Tales of the Insects;* Comstock, *Insect Life;* Lubbock, *Ants, Bees and Wasps;* Packard, *Text-Book of Entomology, Entomology for Beginners, Guide in Study of Insects;* Evan Bruyssel, *Population of an old Pear Tree.* Birds: Chapman, *Handbook of Birds of Eastern North America, Bird Life;* Blanchan, *How to Attract the Birds, Bird Neighbors;* Olive Thorne Miller, *Bird Ways, Upon the Treetops;* J. J. Abbott, *Birdland Echoes, Birds about Us;* John Burroughs, *Wake Robin;* Grant, *Our Common Birds, and How to Know Them;* Wright, *Bird Craft, Citizen Bird;* Gentry, *Nests and Birds of United States.* Trees: F. S. Mathews, *Familiar Trees and How to Know Them;* Apgar, *Trees of Northern United States;* Sir John Lubbock, *Flowers, Fruit and Leaves;* Oliver & Kerner, *Natural History of Plants;* Britton & Beacon, *Flora of Northern States and Canada.* Wild flowers: Grant Allen, *The Story of the Plants;* Gray, *School and Field Botany;* Dana, *Wild Flowers and How to Know Them, Plants and Their Children;* F. Schuyler Matthews, *Familiar Flowers of Field and Garden;* Darwin, *Elements of Botany;* Macdougal, *Nature and Work of Plants;* Baily, *Talks Afield.*

The committees will work together on the questions of germination and fertilization in connection with the garden. The first consideration will be the needs of germinating seeds found by experiments with varying degrees of heat, light, air, and water. The pushing force of germinating seeds will be measured by the following experiment: In the bottom of a deep tube place a given amount of seeds, as one half pint. Pour water on these, and put into the tube a piston rod resting on the seeds. On the rod place a weight of, say, fifty pounds. As the seeds germinate they will raise the piston and weight.

As soon as the trees begin to bloom we shall make paintings of the blossoms, noting those that are diœcious. The larger blossoms of the fruit trees will aid the work. In other flowers, the lily is a good specimen for study, because of its very large organs. Note the position of pistil and stamen in the same flower, and in flower clusters; the drooping position of some flowers and the upright position of others.

Home economics.—During the fall quarter it was impossible to carry out the work planned in the study of foods, and in its place an optional class in cooking was formed after school hours. Based upon this experience of the class, six weeks of the winter quarter were devoted to work upon the food principles.

For the coming term work in physiology is planned from the following standpoint: Food is the basis of all animal life. How does the body obtain and use it? Comparison of the ways in which various animal structures are adapted to meet this need. This subject was chosen with the consciousness that it is utterly impossible to teach physiology in three months, and that at this time in child life a knowledge of the structure of the body and an appreciation of the wonder of its mechanism are helpful in creating respect and care for it.

This particular outline of the work was adopted because it seemed to offer a logical sequence in the thinking, and at the same time to give a single problem with which the children were capable of grappling, namely, animals' means of getting and use of food:

1. Obtaining food—senses and muscles. Comparison of the prehensile organs of animals—fish, quadruped, birds, man. The adaptation of a given structure to its environment, especially adaptation of birds. Stuffed specimens in the museum used in tracing this adaptation.
2. Crushing, tearing, or grinding food—teeth. Comparison of the teeth of various animals and their adaptation to the characteristic food of the animal. Examine skulls of cow, sheep, horse, dog, squirrel, and man which are found in the museum.
3. Making food soluble—mouth and digestive organs.
4. Distribution of dissolved food—blood-vessels.
5. Purifying blood—lungs and respiration.

This brings us to a point which we had reached from another standpoint during the winter. The study of air led to finding the lung capacity of each child, the composition of pure air and air exhaled from the lungs, and that carbon dioxide was the product of combustion. The study of the circulation therefore brings us to the same point and emphasizes the interdependence of functions.

EIGHTH GRADE.

KATHARINE M. STILWELL.

History.—As indicated in the previous outlines, the general plan of history work for the year consists of the development of the idea of government. The history of Rome was selected (1) to emphasize civic responsi-